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EDITOR-IN-CHIEF
Phillip A. Laplante

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or instructions sometimes have to interrupt the stream when an unusual event occurs. When this happens, the pipeline containing the stream of instructions or data must be emptied before execution can continue; this is called flushing the pipe.

pipeline chaining a design approach used in computers whereby the output stream of one arithmetic pipeline is fed directly into another arithmetic pipeline. Used in vector computers to improve their performance.

pipeline interlock a hardware mechanism to prevent instructions from proceeding through a pipeline when a data dependency or other conflict exists.

pipeline processor a processor that executes more than one instruction at a time, in pipelined fashion.

pipelined bus *See* split transaction.

pipelined cache a cache memory with a latency of several clock cycles that supports one new access every cycle. A new access can be started even before finishing a previous one. The access to the cache is divided into several stages whose operation can be overlapped. For instance, the cache can be pipelined to speed up write accesses: tags and data are stored in independently addressable modules so that the next tag comparison can be overlaped with the current write access. Read accesses are performed in a single cycle (tag and data read at the same time).

pipelining a technique to increase throughput. A long task is divided into components, and each component is distributed to one processor. A new task can begin even though the former tasks have not been completed. In the pipelined operation, different components of different tasks are executed at the same time by different processors. Pipelining leads to an increase in the system latency, i.e., the time elapsed between the starting of a task and the completion of the task.

pitch commonly used by physicists and musicians, defined with reference to the frequency. Given two signals with frequencies f_1 and f_2, the difference in pitch is defined by $1200 \log_2 \frac{f_2}{f_1}$. *See also* coil pitch.

pitch angle an angle between a tangent to a helix and another tangent to a cylinder that contains the helix and is perpendicular to the cylinder axis at a common tangential point on the helix.

pitch factor in an electric machine, the ratio of the fractional pitch in electrical degrees to the full pitch, also in electrical degrees.

pivoting when applying Gaussian elimination to solve a set of simultaneous linear equations, the natural solution order is sometimes varied. The process of varying the natural solution order is termed pivoting. Pivoting is used to avoid fill-in and to maintain the accuracy of a solution.

pixel contraction of "picture element:" each sample of a digital image, i.e., a square or rectangular area of size $\Delta x \times \Delta y$ of constant intensity, located at position $(k\Delta x, l\Delta y)$ of the image plane. Also called pel.

pixel density a parameter that specifies how closely the pixel elements are spaced on a given display, usually a color display.

PLA *See* programmable logic array.

placement a placement routine determines an optimal position on the chip for a set of cells in a way that the total occupied area and the total estimated length of connections are minimized.

planar array in addition to placing elements along a line to form a linear array, one can position them on a plane to form a planar array. For